R E P O R T R E S U M E S

ED 013 888 VT 000 855

RESEARCH AND DEVELOPMENT PRIORITIES IN TECHNICAL EDUCATION, A REPORT OF A NATIONAL RESEARCH PLANNING CONFERENCE IN TECHNICAL EDUCATION (THE OHIO STATE UNIVERSITY, JANUARY 10-11, 1967).

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PUB DATE MAY 67

EDRS PRICE MF-$0.25 HC-$1.60 40P.

DESCRIPTORS- *TECHNICAL EDUCATION, *EDUCATIONAL RESEARCH, *RESEARCH NEEDS, EDUCATIONAL PROBLEMS, CONFERENCES, *TECHNICAL OCCUPATIONS,

A SELECT GROUP OF PARTICIPANTS REPRESENTING NATIONAL LEADERSHIP IN BUSINESS, INDUSTRY, RESEARCH, GOVERNMENT, AND EDUCATION MET TO IDENTIFY SOME OF THE MOST OBVIOUS NEW EMERGING TECHNICAL OCCUPATIONS WHICH MIGHT REQUIRE RESEARCH AND DEVELOPMENT EFFORTS AND SOME OF THE MOST PRESSING RESEARCHABLE PROBLEM AREAS IN TECHNICAL EDUCATION. THE NEW OR EMERGING TECHNICAL OCCUPATIONS IDENTIFIED WERE PROGRAMING TECHNICIAN, SYSTEMS ANALYST TECHNICIAN, EDUCATIONAL TECHNICIAN, ANIMAL HEALTH TECHNICIAN, AND ADMINISTRATIVE SCIENCE TECHNICIAN. THE PROBLEM AREAS IDENTIFIED AS CRITICAL WERE LEADERSHIP DEVELOPMENT, WAYS OF KEEPING TECHNICAL TEACHERS UPDATED IN THEIR FIELDS, DEVELOPMENT OF BETTER COMMUNICATIONS WITH EMPLOYERS, RECRUITMENT AND PREPARATION OF TECHNICAL TEACHERS, OPTIMUM INTRA-INSTITUTIONAL ORGANIZATIONAL AND ADMINISTRATIVE STRUCTURE FOR TECHNICAL EDUCATION, DEFINITION OF THE ROLE OF THE TECHNICAL CURRICULUM IN THE HIGH SCHOOL, AND STUDENT SELECTION FOR THE HEALTH RELATED TECHNOLOGIES. POSSIBLE APPROACHES TO EACH PROBLEM WERE SUGGESTED. (FS)

ED013888

a report of a national research planning conference in technical education january 10-11, 1967

RESEARCH AND DEVELOPMENT PRIORITIES IN TECHNICAL EDUCATION

VT000855

The Center for Vocational and Technical Education has been established as an independent unit on The Ohio State University campus with a grant from the Division of Adult and Vocational Research, U. S. Office of Education. It serves a catalytic role in establishing a consortium to focus on relevant problems in vocational and technical education. The Center is comprehensive in its commitment and responsibility, multidisciplinary in its approach, and interinstitutional in its program.

The major objectives of The Center follow:

1. To provide continuing reappraisal of the role and function of vocational and technical education in our democratic society;

2. To stimulate and strengthen state, regional, and national programs of applied research and development directed toward the solution of pressing problems in vocational and technical education;

3. To encourage the development of research to improve vocational and technical education in institutions of higher education and other appropriate settings;

4. To conduct research studies directed toward the development of new knowledge and new applications of existing knowledge in vocational and technical education;

5. To upgrade vocational education leadership (state supervisors, teacher educators, research specialists, and others) through an advanced study and in-service education program;

6. To provide a national information retrieval, storage, and dissemination system for vocational and technical education linked with the Educational Research Information Center located in the U. S. Office of Education;

7. To provide educational opportunities for individuals contemplating foreign assignments and for leaders from other countries responsible for leadership in vocational and technical education.

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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RESEARCH AND DEVELOPMENT PRIORITIES IN TECHNICAL EDUCATION

A Report of a National Research Planning Conference in Technical Education

January 10-11, 1967

The Center for Vocational and Technical Education
The Ohio State University
980 Kinnear Road, Columbus, Ohio 43212

May 1967

The Work Presented Or Reported Herein Was Performed Pursuant To A Grant From The U. S. Office Of Education, Department Of Health, Education & Welfare.

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PREFACE

With significant changes occurring at an unprecendented rate in all facets of technical education, new problem areas are generated which require new and changing research and development priorities. In its commitment to remain sensitive to these changing needs, The Center was pleased to sponsor this Research Planning Conference.

This activity was an outgrowth of a planning session suggested by Bernard Yabroff, Director, and Robert Herman, Project Coordinator, Employment Opportunities Branch, Division of Adult and Vocational Research, Bureau of Research, U. S. Office of Education. The following report represents a summarization of the imaginative discussion, conclusions and recommendations of the conference participants.

Special recognition is due Dr. Aaron J. Miller, Specialist in Technical Education at The Center, who served as conference coordinator and chairman. In addition, The Center expresses its gratitude to the conference participants for their contributions both during and following this conference.

Robert E. Taylor
Director
The Center for Vocational and
Technical Education

FOREWORD

With the rapidly changing administrative structures, funding patterns, and program emphases within the general area of technical education, it becomes imperative that research and development priorities be frequently re-examined. At this research planning meeting, a select group of participants representing national leadership in business, industry, research, government and education identified and discussed some of the problems and their implications as they relate to technical education. Through the inter-action of this group, directions were suggested for future research and development activities in technical education.

The Center for Vocational and Technical Education hopes to build upon ideas and suggestions growing out of this conference by stimulating needed research and development activities in some of the identified problem areas. It is hoped that The Center might further serve as a focal point for the receipt and dissemination of information concerning related ongoing research, research suggestions and ideas, and assist in directing research proposals of merit to agencies capable of exploring funding possibilities with the researcher.

Aaron J. Miller
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CONFERENCE OBJECTIVES

During the past decade there has been an ever increasing amount of research and development activities in the field of technical education. This marked increase in research activities can be attributed primarily to the intensified need for solutions to new educational problems and the availability of research funds for this purpose. However, many of these research efforts have been limited attacks on problem areas of regional or local significance. In the past, little effort has been made to co-ordinate and focus the various national research talents and resources on problems of major significance.

Funds for support of research and development activities in technical education are limited. If the maximum yield from available research funds is to be realized, these resources must be expended in problem areas of greatest priority which have national implications with regard to technician training. With this end in mind, a selected group of national leaders representing educational, governmental, business and industrial institutions, and having a familiarity with and keen interest in the problems of technical education, was called together. This group was given the following charge:

1. To identify some of the most pressing researchable problem areas, with national implications, which affect technical education.
2. To identify new and emerging technical occupations or families of technical occupations which might

require curriculum research and pilot training program implementation.

3. To suggest research priorities for a more unified national research effort toward problem solution.

CONFERENCE SUMMARY

The purpose of this conference was to identify some of the most pressing researchable problem areas in technical education, and to identify some of the most obvious new and emerging technical occupations which might require research and development efforts.

I. New and Emerging Occupations

The following areas of technician manpower needs were identified during the conference. These occupational areas were determined to have manpower needs which exist now or which will exist within the near future. Because of the many criteria for ranking and the importance attached to each of the identified areas, no attempt was made to rank these occupational areas in terms of research or program development priority.

1. Programming Technician: A para-professional engineering technician who can work with computer programmers or serve as a programmer himself.
2. Systems Analyst Technician: A person who can analyze organizational and technical systems into terms a programmer can translate into a computer program.
3. Educational Technicians: A non-teaching para-professional trained to apply the latest technology through hardware and media to specific learning goals.
4. Animal Health Technicians: A para-professional counterpart to the professional veterinarian.

5. Administrative Science Technician: A business oriented systems analyst trained to function at the level of a small business or operation.

II. Technical Education Problem Areas

The following problem areas were identified during the conference as critical areas with national implications which require concentrated research and program development efforts.

1. Leadership Development.
2. Keeping Technical Teachers Up-Dated in Their Fields.
3. Development of Better Communications With Employers.
4. Recruitment and Preparation of Technical Teachers.
5. Optimum Intra-Institutional Organizational and Administrative Structure for Technical Education.
6. Defining the Role of the Technical Curriculum in the High School.
7. Student-Selection for the Health Related Technologies.

With the identification of critical problem areas and emerging technical occupations, alternative structures were suggested by the conferees for follow-up activities designed to stimulate research and development in priority areas. With this done, the objectives of the research planning conference were successfully met.

NEW AND EMERGING TECHNICIAN OCCUPATIONS

With the introduction of new applications of science and technology to business and industry, all occupations are in a state of change. This is especially true of technician occupations; that is, those occupations which frequently require post high school training and are based to some degree on a body of mathematical and/or scientific principles. In many cases new technical occupations exist in business and industry for several years before training programs are implemented to train technicians in the new area of work. Technicians who work in new and emerging occupations for which no training programs exist generally have received their training in a related technical area and have received training on the job to meet the new technical occupations demand. However, this is not the most efficient method for satisfying emerging technical manpower needs.

As technology advances, various research and development activities in business and industry provide unmistakable clues to emerging occupational areas in which large numbers of technicians will be needed in the forseeable future. By identifying these emerging technical occupations, manpower training needs may be anticipated. Through proper educational research and development activities and procedures, curriculum research may be implemented which will provide a structure for the curriculum of a training program that will satisfy

manpower needs of the new or emerging occupation. Based upon this developed curriculum, pilot programs may further be implemented and evaluated so that by the time manpower needs exist in quantity, tried and tested curricula for realistic training programs are in existence.

Projecting technical manpower needs in emerging occupational areas is indeed perilous. However, by utilizing the best thinking of highly qualified experts in business, industry, education and government it is possible to identify general occupational areas where emerging needs seem to be obvious.

Because of the large number of variables that could be considered as criteria for assigning priorities for research and development activities in the identified technical occupation areas, it was the consensus of the conference participants that no specific priority for research should be assigned to these areas. It was agreed that each of the identified new and emerging technical occupations was important in its own right and that research resources should converge on these individual areas as time, personnel, funds, and innovative research designs permit. It is understood that the list is not exhaustive nor is it intended to represent total demands.

The following technical occupations have been identified as new or emerging occupations which are believed to be worthy of curriculum research and/or pilot program development efforts:

1. <u>Programming Technician</u>:

There are many training programs today in the areas

of business, scientific and technical data processing. However, these curricula are based on second-generation computer hardware and software which is rapidly becoming obsolete by third-generation equipment, programs and operating systems. Because of the rapid growth of the computer field and the accompanying manpower needs, a real need exists to update these curricula, particularly in terms of new programming languages and operating systems.

2. Systems Analyst Technician:

One of the newest and most rapidly developing areas of management is in the realm of "total systems analysis and implementation." This process is concerned with the analysis of entire operational systems in business, government, education,and industry as distinct from their separate parts.

The need in this area is for the para-professional systems analyst technician. This is a person who can apply technical knowledge and skill to a systematic translation of problems into operational technical systems.

3. Educational Technicians:

Educational technology is a movement to directly increase learning efficiency. This thrust is being achieved through the combined expertise of educators, psychologists, learning specialists and information

equipment (hardware) engineers in developing a systems approach to educational problems. The development of this new professional area is stimulated by the recent entry of a number of the nation's major businesses and industries into the educational field.

Further evidence of the growth in this area is provided by the development of professional educational technology programs in graduate schools across the country.

The educational technician aids the teacher as the para-professional who is trained to translate and apply hardware and media technology to specific educational or learning goals.

4. Animal Health Technician:

Considerable attention has been devoted to the shortage of technicians in fields relating to human health. Similarly, a significant shortage of personnel exists in the field of animal health.

The animal health technician works in conjunction with his professional counterpart, the veterinarian, in the many various private and commercial activities involving the health of animals.

5. Administrative Science Technician:

In the near future data processing will spread to small business and industry. The forthcoming availability of moderately priced computers will allow small

businesses to avail themselves of scientific management techniques which large businesses now employ. As a result, a need will arise for a small business systems specialist and programmer. This specialist is the administrative science technician.

The administrative science technician is the designer of the management system for the computer. However, he is more than a conventional data processing technician or computer programmer. He is a person with a sound background in business administration, scientific management techniques, data processing accounting and with special training and skill in systems analysis. This person might be thought of as a business oriented systems analyst at the micro or small enterprise level.

PROBLEM AREAS IN TECHNICAL EDUCATION

While many problem areas of concern which affect the total technical education effort are identifiable, a principal goal of this conference was to identify the most critical problem areas which might merit a concerted research and development effort. The following problem areas were identified as meeting these criteria.

I. Leadership Development and Training

Within the past decade there has been a tremendous growth in post high school technical education programs. As the manpower needs of industry continue to increase (both in numbers of technicians needed and levels of skill needed for entry level employment), post high school technical education program development will undoubtedly continue. A critical problem associated with this trend is the shortage of properly trained post high school technical teachers and administrators. With the rapid development of new post high school institutions and their associated technical training programs, a critical need clearly exists for administrators who are qualified to plan, implement, operate and evaluate technical education programs. This includes the capability to efficiently inaugurate programs from the planning stages through the necessary procedures of building, staffing, equipment purchase, curriculum development, student recruitment, placement and follow-up. The acute shortage appears to be both in existing and newly developed institutions and in state departments of education.

Industry has recognized its needs in the management development field for many years. It is not unusual for many industries to spend a significant portion of their budgets for management development and training. In contrast, education spends virtually nothing in the area of management development and training.

Many excellent programs presently exist in colleges and universities which train educational administrators in areas other than technical education. There are, however, few progams available for the potential leader in technical education who wishes administrative training at the college level that will prepare him for technical education leadership role in post high school institutions.

Several colleges and universities either have or are developing "model" training programs in this area. For example, one such "model" program at a major university provides eight weeks of intensive summer training plus one year of administrative internship. A few other colleges and universities provide graduate training in vocational and technical administration on a cooperative work basis. However, training programs for post high school technical teachers and technical education administrators simply do not exist in the quality and quantities needed to meet the critical national demands.

Possible approaches to the problem

A. One suggested approach to development of technical teacher and administrator training programs is a consortium approach whereby a number of institutions work together to

provide a model teacher training or administrative training program. This model program could be evaluated for duplication elsewhere. This multi-institutional approach would provide for the most efficient utilization of facilities and the combined best thinking of the faculty at the cooperating institutions.

B. Insights into solutions for this problem might be gained by documenting and building upon what is presently being done in the few existing "model" programs in the area of technical teacher education and technical education administrative training. A review of the various kinds of programs that are in existence and how they are either successful or unsuccessful in meeting the needs in certain areas should provide aid in the development of new and innovative programs.

II. Keeping Technical Teachers Updated in Their Fields

As technology grows and changes at an unprecedented rate, it becomes increasingly difficult for a technical teacher to remain current in his field. With new discoveries and applications of technology, it becomes essential for the technical teacher to keep abreast of changes in industry and to be frequently brought up-to-date on new technological developments. The necessity of a technical teacher being aware of the current state of his art is obvious.

Besides the necessity for the technical teacher to remain abreast of changes in industry, frequent industrial experience has many other benefits for the technical education teacher. Often the teacher will develop industrial contacts which may later lead to student placement or to the donation of late model equipment for training. Generally, employers are cooperative in providing a planned sequence of work experience for the upgrading of technical teachers; they are quick to see the benefits from such cooperation. They frequently identify new sources of potential employees. Employers are generally eager to assist in suggesting the latest in curriculum improvements, particularly as they relate to that employer's interest.

There are a number of programs presently under way in various states which provide for technical teachers to return to industry for upgrading in their respective fields. In some states, technical teachers are required to periodically obtain

occupational experience in their specialized subject matter area for recertification. In other states or communities, technical teachers may be required to gain valid work experience during the summers. In fact, the institution in which they teach may have a cooperative program whereby the teacher teaches for a given number of semesters or quarters, then works in a technical occupation for a semester or quarter. It should be recognized, however, that summer work experience doesn't necessarily guarantee a teacher's adequate exposure to current technology. Unless the summer work experience is well planned with the employer, the teacher may see only one small segment of a greatly diversified industry.

Within the past few years, a number of summer institutes for technical teachers have been funded by various federal agencies and sponsored by institutions across the nation. These institutes are generally designed to bring technical teachers to a campus for a summer of intensive technical training. The curriculum content of these institutes is generally related to the latest and newest developments in their respective fields of technology.

Possible approaches to the problem

A. A number of reasons exist why teachers are unable to maintain technical competence through periodic returns to business or industry. One example might be the problem of teacher certfication requirements. In many states, experienced teachers are required to return to the university campus summer

after summer for repeated pedagogical training. One cannot deny that a good foundation of skills in "how-to-teach" are most important for the technical teacher. However, technical competence and a knowledge of the current state of the art are of equal importance. These and other problems which impede the periodic upgrading of teachers must be identified and dealt with accordingly.

B. A contribution to the solution of this problem would be an analysis and documentation of what is being done across the nation by various states and communities to upgrade and keep their technical staff up-to-date. In this review, the various programs, schemes, and methods of upgrading presently in use could be described. The following questions might be answered by such a review:

(1) how often should technical teachers be expected to return to industry or to some upgrading program?

(2) how long should this training program be?

(3) how effective are summer institutes in providing knowledge of current industrial technology practices?

Based upon this information, research and program development proposals might be submitted for the development of specific kinds of programs which might meet the need in this critical area.

C. Another possibility for consideration in solving this training problem could involve the development of special training "packages" to periodically bring teachers up-to-date. These complete and periodically revised "packages" could contain guides, text materials, audio visual materials, etc. Such a "package" could be used by the teacher as a programmed learning device for himself. The "package" might also be designed as instructional materials or equipment for the teacher to use in his classes. In either event, the "package" would have to be generated in conjunction with knowledgeable industrial sources.

III. Development of Better Communications with Employers

In most all areas of technical education a critical need exists to establish a better communication between vocational and technical education and industry. One of the fundamental objectives of technical education is to train for the labor market. To do this job effectively, both the teacher and the administrator must have a sensitivity to and a feeling for labor market needs. There must be a constant feedback between technical education and the employees who consume the educational product. In the past, this free flow of communication between technical educators and employers has frequently not existed.

Strangely enough, the vehicle for optimum communication between the two groups, which is advisory committee or council, generally exists in most communities where technical education programs are offered. Yet these advisory services are frequently not used to maximum effectiveness because technical educators do not understand the techniques necessary to select an advisory group and to utilize that group's services with maximum effectiveness.

Possible approaches to the problem

A. One possible approach to the problem would be to review and document what is currently being done by the institutions that have programs sensitive to communications with employers. This review might indicate the optimum role of the educational institution, employers, labor groups, and community action

groups within this communications structure. From such a review of what is being done both by successful and unsuccessful programs, methods and alternatives could be suggested for more efficient communication systems between technical education and employers.

IV. Recruitment and Preparation of Technical Teachers

Basic to the abiding problem of the shortage of teachers in technical education is the problem of preparation and recruitment of potential teachers into the field. There seem to be numerous factors which impede technical teacher recruiting. Most of these factors combine themselves into four general areas:

Salary. Besides a common problem of salary schedules being too low, some institutions offering technical education programs have the compounding problem of a common salary schedule for all faculty members of similar academic rank. This makes it very difficult for an institution to pay the necessary market price to attract top teachers with valid experience for teaching positions.

Teacher Education Programs. The lack of programs for the preparation of technical teachers is probably one of the most serious factors which contributes to the shortage of technical teachers. One reason for the lack of an adequate number of programs is the absence of a rather clearly defined program for the preparation of technical teachers.

Certification. In some states and communities, unrealistic certification requirements provide a roadblock to technical teacher recruiting. New teachers are, in many cases, required to take a

seemingly impossible string of questionable course work summer after summer to be able to be recertified for the next teaching year.

Equipment. In many technical education programs the laboratory equipment and equipment used for instruction is obsolete and outdated. Often, potential teachers are reluctant to become involved in teaching programs where obsolete and inadequately equipped laboratories are used for instruction.

Possible approaches to the problem

A. One logical approach to the recruitment problem is to review the state of the recruiting art to see what others are doing who are meeting some generally accepted criterion of success with their recruiting methods. The successful systems and techniques must be documented so that the very best efforts of those involved in teacher recruitment around the nation can be shared with others who have similar problems at less successful institutions. More data is needed concerning successful graduate follow-up programs where technical graduates are followed in their industrial careers for later use as a recruiting source for technical teachers.

B. With regard to preparation of teachers, the profession needs to know the characteristics of a good technical teacher; that is, the skills, knowledge, attitudes, and abilities needed by this successful teacher. With these data in mind it might be possible to devise developmental pilot programs designed to develop these desirable skills and competencies in the potential

teacher. In addition, this revealing data could be compared with present certification standards in effect throughout the country. This should reveal any unrealistic certification requirements which presently exist.

C. Some teacher training institutions and agencies have experienced moderate success in their teacher recruting by using information dissemination programs which are designed to tell potential teachers of the career opportunities in technical education. However, the degree to which information and innovative dissemination techniques help in technical teacher recruiting remains to be established. Innovative pilot programs in the dissemination of information aimed at technical teacher recruiting might provide a solution to one facet of this complex problem.

V. Optimum Intra-institutional Organizational and Administrative Structure for Technical Education

A major factor contributing to the success of technical training programs is the organizational and administrative structure of the institution within which the training programs must operate. A considerable body of knowledge is available concerning state and local administrative structures external to the institution; however, little information is available concerning the administrative structure and educational climate within the institution. This intra-institutional structure is extremely important to the success of technical education programs. This is true both at the high school level and at the post high school level.

Possible approaches to the problem

A. Before an optimum organizational structure can be recommended, it would first be necessary to determine the educational goals of the institution. After these goals have been fairly well crystalized in the minds of all concerned, it might then be possible to determine the factors which impede the attainment of these goals. Some of the questions that might be asked are:

(1) What are the goals of the various groups within the institution and is there general agreement concerning these goals? These groups might be comprised of technical specialty teachers, related technology teachers, and academic teachers within the institution.

(2) What are the impediments to these goals?

Teachers, department heads, deans, etc. might be surveyed to derive concrete suggestions relative to optimum intra-institutional administrative structures.

VI. Defining the Role of the Technical Curriculum in the High School

As jobs become more technical and sophisticated, the entry level requirements for technical workers rise accordingly. Today, well over 60 percent of all technician training programs are in post high school institutions. Also, the greatest percentage of increase in new programs continues at the post high school level.

This shift upward in technical skill requirements for workers does not negate the need for high school level technical education programs. Because of increasing entry level requirements for technical workers and the decrease of jobs at the semi-skilled level, it becomes imperative that the role, purpose, and goals of high school vocational and technical programs be reappraised. It is essential that the role of high school technical education be identified and defined in terms of optimum effectiveness.

Possible approaches to the problem

A. There are a few highly successful high school level technical education programs throughout the country. One approach to the problem would be to review these programs to determine the characteristics of successful high school technical programs. These successful programs should be examined to determine how the training program relates to the needs of the labor force, local industry needs, and the overall success of placing its graduates on bona fide technician level jobs.

B. The high school technical program should be examined in terms of the technical student's ability to make a smooth transition to post high school technician training, if this is an objective of the program.

From this careful examination of both successful and unsuccessful high school technical programs, an appropriate training role should be suggested.

VII. Student Selection for the Health Related Technologies

One of the fastest growing technician occupation areas is in the health related technologies. Manpower surveys indicate that this trend will continue far into the future.

A considerable amount of research has been done to identify potentially successful students in the engineering related technologies. Yet relatively little work has been done to identify the potentially successful technician in the health related occupational clusters.

It appears that certain non-intellective psychological factors and value attitudes are essential to success in certain health related technologies. While a certain degree of manual dexterity and mechanical comprehension may be common to most all technician occupations, the non-intellective psychological factors and personal values may differ. Hence, one of the keys to the proper counseling and guidance of potential students into the health related technologies may be in the identification of a unique pattern of non-intellective psychological and sociological prerequisites.

Possible approaches to the problem

A. One approach to the problem would be to analyze the occupations relating to the medical technologies. Such an analysis might well indicate a unique clustering of skills and activities found principally in the health related occupations. Further, it might be appropriate to analyze such things as value orientation, psychological needs, and

academic or intellective factors, and how these many intellective and non-intellective factors relate to student success in the health related technologies.

Such information could prove invaluable for the counseling and guidance of appropriate students into the health related occupations.

RESEARCH AND PROGRAM DEVELOPMENT PRIORITIES

One of the primary goals of the Research Planning Conference was the establishment of a hierarchy of research priorities with regard to both critical problem areas and new and developing occupations. As the conference progressed it was apparent that all of the areas were important and that any research priority might well be finally decided upon the research design, research resources, and talent available for any given problem area at any given time. Therefore, no fixed priorities were assigned because of the obvious difficulty of establishing criteria for ranking.

Overtones of priority were readily visible in general conference discussions. First, with regard to problem areas, the shortage of trained personnel in the area of technical education seemed of paramount importance. This shortage seems to exist in both the teaching and administrative ranks at all levels.

Second, with regard to new and emerging occupations, almost all of the new and sophisticated technical occupations seemed to involve skills, knowledge and capability in systems analysis or the utilization of the systems approach in technical problem solution. It therefore seems that research and development in the systems approach to problem solutions in all areas of technological curricula would be appropriate.

APPENDIX

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OTHER CENTER PUBLICATIONS

"Guidelines for State Supervisors in Office Occupations Education." 1965 Business Clinic

"Program Development and Research," A Report of a National Seminar on Agricultural Education. 1965

"A National Vocational Education Seminar on the Administration of Research." 1965

"Guidance in Vocational Education: Guidelines for Research and Practice." 1966

"Research Planning in Business and Office Education." 1966

"Evaluation and Program Planning in Agricultural Education." 1966

"A National Leadership Seminar on Home Economics Education." 1966

"Report of a National Invitational Research Planning Conference on Trade and Industrial Teacher Education." 1966

"Systems Under Development for Vocational Guidance." 1966

"Research Development and Coordination." 1966 Seminar Report

"Guidelines in Cooperative Education," A Report of a National Seminar on Cooperative Education. 1967

"A Survey of Vocational Education Programs for Students with Special Needs." 1967

"The Demand for Teachers in Vocational and Technical Education." 1967

"Compilation of Technical Education Instructional Materials - Supplement I." 1967

"Compilation of Technical Education Instructional Materials - Supplement II." 1967